HIGHER EDUCATION

SEMIMONTHLY PUBLICATION OF THE FEDERAL SECURITY AGENCY
Office of Education, Higher Education Division

VOL. VII, NO. 7 WASHINGTON, D. C. DECEMBER 1, 1950

PERIODICAL ROOM
GENERAL LIBRARY
UNIV. OF MICH.

Carnegie Plan of Professional Education in Engineering and Science

THE CARNEGIE INSTITUTE OF TECHNOLOGY, about 14 years ago, undertook to develop an integrated program of professional education in engineering and science. Among the significant features of the program is the emphasis on the solving of problems as a means of developing ability to think constructively and the equally important ability to learn effectively from professional experience. A recent statement from the Institute, quoted verbatim in the following sections, sets forth the principal features of the program as it is now in operation.

Objectives

The aim of professional education at Carnegie Institute of Technology is to equip students to go on learning after graduation and to grow throughout their lives in professional and personal stature and in usefulness as citizens. Carnegie does not seek to *train* students to *be* professional practitioners at graduation but rather to *educate* them so that they will *become* professional men of full stature.

Instruction is therefore planned to help each student acquire the following:

1. Thorough and integrated understanding of fundamental knowledge in the fields covered by the student's curriculum, and the ability to use this knowledge.

2. Genuine competence in the orderly way of analytical thinking which professional men and scientists have always used in reaching sound, creative conclusions; to the end that after graduation the student can, by such thinking, reach his own decisions in his profession and as a citizen.

3. Ability to learn for himself with scholarly orderliness; so that after graduation he will be able to grow in wisdom and keep abreast of the changing knowledge and problems of his profession and the society in which he lives.

4. The philosophical outlook, breadth of knowledge, and sense of values which will increase his understanding and enjoyment of life and will enable him to recognize the human, economic, and social problems of his professional work; and the breadth of ability to use his professional powers in dealing with these problems and those which he will meet as a citizen and a person.

General Characteristics

Instruction is focused upon fundamental content useful in later learning, rather than upon the amassing of particulars of knowledge and technique that can better be learned at the time of use. In advanced courses, emphasis is also placed on using the fundamentals learned in earlier courses.

The work of the student from the beginning of the freshman year until graduation consists in considerable measure, of his own application of funda-

IN THIS ISSUE

	Page
Carnegie Plan of Professional Education	73
Cost of Going to College	75
Communications Research	75
New University for Malaya	76
School of International Studies at Hopkins	77
Earned Degrees Conferred, 1949–50	77
Financing Medical Education	80
International Summer School in Sweden	82
Exemption from Entrance Requirements	83
Fourth Salzburg American Seminar	83
Applications to Dental Schools	83
New Publications	83

914169—50

As Education Becomes Professional

Smith, Elliott Dunlap. "Can Humanistic-Social

mental knowlege in handling specific problems and in learning from observation and experience. In order to insure that this analytical thinking is well-ordered, the instructor guides and disciplines the student's thinking, but the student does the thinking. The student thereby acquires a working understanding of basic principles, concepts, and techniques, and the ability to use them independently both in learning and in handling problems.

Each curriculum is arranged to provide cultural breadth, and the humanistic and social courses are taught as an integral part of the student's professional education. Above all, learning is unified by insistence that, in handling problems in every field, the student know and use the basic order common to all well-ordered professional and scholarly thinking.

The abilities to deal with professional, social, and human problems are thus merged into a common ability applicable to problems of all sorts. Because of this unity, whatever increase in analytical power the student gains in one field strengthens his power to solve problems and to learn in all other fields; and after graduation, growth in professional stature involves growth in stature as a human being and citizen.

Interrelated Programs

Each curriculum in the College of Engineering and Science consists of three interrelated programs—the basic science, the technological and advanced science, and the social relations. Together they constitute undergraduate education for professional work.

These progams unite in developing the four qualities that lift the work of the professional engineer or scientist above that of the technician—breadth, fundamental understanding, power of analysis, and scholarly attitude and style. The basic science program aims to develop these qualities by teaching fundamental mathematics and physical science in the way that will make them most useful in the technological and advanced science programs and in professional work after graduation. The technological and advanced science program aims to develop these qualities by teaching the use of fundamental science in dealing with problems of engineering or advanced science. The social relations program aims to develop these qualities by teaching the student how to express himself clearly and how to understand and deal with the problems involved in working with people, and with political, social, and economic institutions.

Learning To Think

A man who has spent 4 years in college largely in acquiring information and in learning techniques is under a discouraging handicap if later, in the crowded hours of professional practice, and without a guiding discipline, he must learn how to think for himself. The basic science, and the technological and advanced science programs recognize this, a from the time a subject is started, and so long it is taught, the development of thoroughness understanding and disciplined power to use fund mental principles in independent thought is t primary aim. In the more elementary courses th is a difficult aim to combine with thorough instru tion in the principles and tools of the subject, a at times the student must expect the work to consi largely in the patient mastery of these principles a tools.

Professional work in engineering and science i volves much more than exact mathematical applic tion of engineering formulas or even of scientif principles. In so far as an engineer or scientist do truly creative work, he must solve problems for whic no formulations have been devised and make judg ments from scientific principles in situations whe mathematical manipulations cannot indicate the fu solution. Even in less creative work he must de with the materials and forces of the real world, a these do not coincide exactly with the abstractio of pure science. Again and again the professiona scientist or engineer must work with intangib factors, and alternatives and even speculative hy potheses. Yet in dealing with such problems, he mu apply the same thoroughness and orderliness thought that he applies to problems subject to math matical solution. This is an extremely difficult a important thing to learn how to do well. To he the student learn how to do it is a major aim i the more advanced courses in technology and scienc

Gaining Breadth of Mind

An exclusively scientific and technological educa tion would tend toward a narrowness of mind tha would be a handicap in professional engineerin work, even in its technological aspects. It is there fore important for the engineering or scientific stu dent to take courses which expand his opportunitie to learn how to think his way out when in his pro fessional work he is faced with perplexities to whic no existing formulations give means of solution The social relations program provides such course and by broadening the area in which the student do well-ordered thinking, reinforces the technologica courses in developing analytical power.

As an engineer or scientist attains professiona stature and rises in his profession, he must increas ingly deal with people. As he becomes more impor tant in his community, he must assume greate responsibilities of citizenship. The social relation program is therefore also designed to assist the studen to learn how to express himself effectively to othe and how to apply to problems of dealing with peopl and with human institutions the engineering orde liness and thoroughness of thought. Finally, it designed to give him habits of appreciation and en joyment of good reading, music, or art which wi assist him to enrich his life and broaden his under standing.

As Education Becomes Professional

As the study of engineering advances, the scientific, the technological, and the social relations aspects of learning increasingly merge into learning to deal with complex problems as a whole. The three programs which constitute professional education in engineering and science thus unite in giving a well-rounded education that will prepare the student to grow in his power to handle the creative, the human, and the economic problems of his engineering or scientific work, and to take his place in the world as a competent and responsible citizen.

Methods of Teaching

The plan outlined in the statement quoted above involved a fundamental change in teaching, which is indicated as follows:

Instead of learning primarily from memorizing, from technical exercises, and from reciting from textbooks and lecture notes, the student learns how to extend knowledge through making inductions from concrete observations or instances. He also learns how to use knowlege through the analytical handling of concrete problems. In this sense it is a change similar to that made when the case method was introduced into the teaching of law and the clinical method into the teaching of medicine.

Such a reconstruction could not proceed as fast in technological education, however, as it did in law and in medicine. For the practice of engineering does not provide material in a form suitable to educational use comparable to recorded law cases and medical clinics. Hence, the materials of instruction as well as the methods of instruction have to be devised from the ground up.

References

The plan of education at the Carnegie Institute of Technology is due largely to the ideas and administration of Robert E. Doherty, president of the Institute from 1936 to 1950. Since 1946 Provost Elliott Dunlap Smith has furthered and directed the program. An enthusiastic and competent faculty has given hearty support in devising the plan and in developing and using teaching methods and course content appropriate to the objectives to be accomplished.

The following references provide further information concerning the program of the Institute and its purposes:

Carnegie Institute of Technology. *Report of the President to Alumni and Friends.* Pittsburgh, Pa., The Institute, 1948.

Doherty, Robert E. "The Engineering Profession Tomorrow." *Journal of Engineering Education*, Vol. 35, No. 1 (September 1944), p. 8–14.

Smith, Elliott Dunlap. "Can Humanistic-Social Study be Made Engineering Education?", *Journal of Engineering Education*, Vol. 36, No. 2 (October 1945), p. 134–8.

———. "The Education of Professional Students for Citizenship." In *Education for Professional Responsibility*, (Pittsburgh, Pa., Carnegie Press, Carnegie Institute of Technology, 1948), p. 188–203.

Teare, B. R., Jr. "Planning the Professional Aspects of the Humanistic-Social Courses." *Journal of Engineering Education*, Vol. 37, No. 4 (December 1946), p. 344–52.

Teare, B. R., Jr. Teaching Methods in Engineering Analysis. *Journal of Engineering Education*, Vol. 35, No. 10 (June 1945), p. 599–609.

———. The Use of Problems and Instances to Make Education Professional. In *Education for Professional Responsibility*, (Pittsburgh, Pa., Carnegie Press, Carnegie Institute of Technology, 1948), p. 135–50.

Cost of Going to College

THE TULANE UNIVERSITY School of Social Work, using 50 of its full-time out-of-town students as a sample group, has found that, on the average, it costs a non-resident college student $1,739 for 36 weeks of schooling in a regular school year. This amount was distributed among various items as follows. (1) Food and housing, $673, (2) tuition, fees, school supplies, and library fines, $470, (3) clothing, clothing upkeep, and laundry, $205, (4) recreation, $153, (5) transportation, $42, and (6) miscellaneous, including health services, correspondence, gifts, barber and beauty care, tobacco, church and other contributions, insurance, income tax, and professional dues, $196.

Communications Research

A NEW RESEARCH PROGRAM is being established this fall at Emory University in Atlanta to help the press, radio, movie, and television do better work. Typical of the projects contemplated are studies in the changing reading and listening habits of Atlantans from high school to adult life and the effect of color on product and idea acceptance. A poll may be established to sample opinions of Georgians on matters of current interest.

New University as Center of National Culture for Malaya

By SIR ALEXANDER CARR-SAUNDERS*

THE VARIOUS RACIAL GROUPS are joining spontaneously in a common citizenship; there is talk of a Malayan nationality; a Malayan patriotism is growing. We are witnessing in Malaya the birth of a nation . . . and a University can play a notable part in its making."

These words were spoken by Malcolm MacDonald, Britain's Commissioner-General in South-East Asia, when as Chancellor he addressed the new University of Malaya on Foundation Day, October 8, 1949. In conformity with the recommendation of a British Commission which visited Malaya in 1946, the new university has been formed by the fusion of two colleges, the King Edward VII College of Medicine, opened in 1905, and Raffles College, opened in 1928, both in Singapore.

The New University

Until the university was founded, the colleges were entirely independent. While each had developed teaching to a high level, they were able only to grant diplomas and certificates. Now they are united to form a corporation under the title of the University of Malaya with full degree-granting powers. But though united constitutionally, the colleges remain separated geographically, the distance between them being over 2 miles.

The Commission of 1946 recommended that they should be brought together, and suggested that both should be moved to a site near Johore Bahru—a site of great natural beauty where there is ample space for extension. Britain's Government has promised a gift of £1,000,000 towards the cost of the new buildings which will be needed, and a local appeal for funds has been launched to which generous contributions have already been made.

The birth of another university in the Commonwealth is no small event. Modern communities depend for their proper functioning and well-being largely upon the services of those belonging to the professions—doctors, lawyers, civil servants, architects, engineers, and so on. One of the duties of a university is to educate new entrants to these professions, by giving them not only the basic knowledge indispensable for practice; but also the liberal learning which enables them to play a part as influential members of the community.

In a country with no university, either the local people must be educated abroad, or professionals from abroad must be brought in. The founding of the university thus makes possible the recruitment, to all the higher professions in Malaya, of Malayans who, since they will be educated locally, will be educated more appropriately for rendering service to their country than if they went to a university elsewhere.

Towards Self-Government

The new foundation is, therefore, a big step towards self-government in Malaya; for it will be largely in the university that the future teachers of the nation will be trained. Indeed, regarded as a place of higher education, a university is a necessary instrument in the advance to responsible nationhood. But a university is more than a place of higher education; it is also a place where learning is advanced.

There is a world-wide community of learning devoted to the preservation, dissemination, and advancement of knowledge. Malaya, through its university, now becomes a member of this community. At the same time it will be the duty of the new university to have special regard for Malayan culture and Malayan learning, and to be the center where Malayan problems are actively investigated. Such a center is of great service for a country preparing for self-government, and when self-government is attained it will be a source of information and inspiration for those who will guide the nation.

As a center of national culture, the new university will be of peculiar importance to Malaya. The country is rich in that within it are found the ancient traditions and cultures of Malayans, Chinese, and Indians. While these riches must be preserved, there is also need for a sense of a community common to those of all colors, races, and creeds. The young men and women who formerly mingled in the two colleges and now associate in the university do

*Director of the London School of Economics and chairman of the Commission on Malayan University Education, which in 1948 made a recommendation to grant full university status to two colleges in Singapore.

so freely and without regard to "racial" differences. In this way a nation is being born, all the better endowed for the diversity of the elements which are contributing to form it.

School of International Studies at Hopkins

JOHNS HOPKINS UNIVERSITY has announced that the School of Advanced International Studies, in Washington, D. C., has become a graduate school of the university. The school will remain in Washington.

The School of Advanced International Studies was founded in 1943 as a training center in the field of international affairs. It was sponsored by the Foreign Service Educational Foundation, a nonprofit organization formed in 1943.

The new arrangement does not involve duplication of the work carried on in the university's Walter Hines Page School of International Relations. The Page School is primarily a research institute devoted to Far Eastern Affairs, and its personnel consists principally of senior faculty members and students who have obtained doctoral degrees. The current major activity is an extensive study of Mongolia—its literature, culture, and place in the international scheme.

Earned Degrees Conferred, 1949-50

By ROBERT C. STORY*

THE COLLEGES AND UNIVERSITIES of the United States last year graduated their largest classes in their history. Almost 500,000 students received degrees during 1949–50. This represents an increase of about 18 percent over the preceding year and almost 130 percent more than in the peak prewar year of 1939–40.

Third Annual Degree Survey

The Office of Education has just completed its third annual survey of earned degrees conferred by the colleges and universities. In 1949–50 there were 1,294 institutions of higher learning which conferred degrees. Reports were obtained from all but 12 of these institutions. The nonresponding schools were all relatively small, the estimated bachelor's degrees for the entire group being somewhat less than 1,000. This estimate is included in order to present an inclusive national total.

The survey shows that 433,734 bachelor's and first professional degrees were conferred in 1949–50. (See table 1.) Master's and second professional degrees numbered 58,219, and doctor's degrees 6,633.

The large number of bachelor's and first professional degrees conferred in 1949–50 reflects the very large entering class of the fall of 1946 when almost 700,000 students enrolled in college for the first time.

*Head, Technical Services Unit, Research and Statistical Service, Office of Education.

Men and Women Students

More than three times as many bachelor's degrees were earned by men as by women. (See table 2.) During the prewar years the ratio of men graduates to women graduates was less than 2 to 1. The number of men earning their first degrees during 1949–50 was about 25 percent greater than in 1948–49, while the increase in the number of degrees conferred on women was slightly over 1 percent.

Table 1.—Degrees conferred by institutions of higher education, 1949–50 and 1948–49

Level of degree	Number of degrees conferred		Percent of increase
	1949–50	1948–49	
Bachelor's and first professional	433,724	366,634	18.3
Master's and second professional	58,219	50,827	14.5
Doctor's	6,633	5,293	25.3

Table 2.—Number of degrees conferred by institutions of higher education, 1949–50, by sex of recipients

Level of degree	Number of degrees conferred		
	Total	Men	Women
Bachelor's and first professional	433,734	329,819	103,915
Master's and second professional	58,219	41,237	16,982
Doctor's	6,633	5,990	643

The ratios of men to women receiving the advanced degrees were: (1) Master's and first professional, 2.4 to 1; (2) doctor's, 9.3 to 1. The number of men receiving master's and second professional degrees increased almost 17 percent from 1948–49 to 1949–50, while the number of women earning these degrees increased about 9 percent. Increases in the number of doctor's degrees during the same time were: (1) for men, 26 percent; (2) for women, 23 percent.

Table 3.—Number of degrees conferred by institutions of higher education, 1949–50, by type of control of institution

Level of degree	Number of degrees conferred	
	Publicly controlled	Privately controlled
Bachelor's and first professional	217,389	216,345
Master's and second professional	26,192	32,027
Doctor's	2,668	3,965

Types of Institutions

Of the 1,294 degree-granting institutions included in this report, 345 are publicly controlled and 949 are privately controlled.

The publicly controlled institutions in 1949–50 conferred 1,044 more bachelor's and first professional than were conferred by those under private control, but in the year 1948–49 the privately controlled institutions conferred almost 5,000 more of them than did the institutions under public control. In both years more advanced degrees were conferred by the privately controlled institutions.

The 10 institutions granting the largest number of degrees included: the University of California, 11,239, New York University, 8,931, Columbia University, 8,119, the University of Illinois, 7,447, the University of Minnesota, 7,091, the University of Michigan, 7,055, the University of Wisconsin, 6,243, Ohio State University, 5,764, the University of Southern California, 5,097, Syracuse University, 4,673.

On the bachelor's and first professional degree level more degrees were conferred in business and commerce (72,137) than in any other field of study. (See table 4.) Engineering degrees numbered 52,246 while education ranked third with 46,635.

Master's degrees in education (18,311) considerably outnumbered masters' and second professional degrees conferred in any other field of study. Engineering ranked second with 4,496 degrees, and business and commerce third with 4,335.

On the doctor's level the greatest number of degrees were conferred in chemistry (953), education (861), and engineering (417).

Table 4.—Earned degrees conferred by institutions of higher education 1949–50, by major field of study and by sex

Major field of study	Number of degrees conferred								
	Bachelor's and first professional [1]			Master's and second professional [2]			Doctor's [3]		
	Total	Men	Women	Total	Men	Women	Total	Men	Women
All degrees	433,734	329,819	103,915	58,219	41,237	16,982	6,633	5,990	643
Agriculture	10,908	10,766	142	1,080	1,070	10	316	312	4
Anatomy	123	121	2	65	54	11	15	11	4
Animal husbandry	1,697	1,677	20	135	133	2	26	26	----
Anthropology	324	186	138	82	57	25	34	27	7
Architecture	2,563	2,441	122	166	159	7	1	1	----
Astronomy	30	26	4	22	18	4	16	15	1
Bacteriology	870	563	307	327	247	80	74	60	14
Biochemistry	175	160	15	144	114	30	116	99	17
Biology	10,428	8,121	2,307	549	419	130	81	69	12
Botany	494	385	109	299	234	65	126	116	10
Business and commerce	72,137	65,911	6,226	4,335	4,006	329	58	52	6
Chemistry	10,619	9,134	1,485	1,576	1,368	208	953	914	39
Dental science	335	282	53	89	84	5	1	1	----
Dentistry, D. D. S. only	2,579	2,561	18	----	----	----	----	----	----
Economics	14,573	13,471	1,102	921	807	114	200	191	9
Education	46,635	18,882	27,753	18,311	10,588	7,723	861	719	142

See footnotes at end of table.

Table 4.—Earned degrees conferred by institutions of higher education 1949–50, by major field of study and by sex—Continued

Major field of study	Number of degrees conferred								
	Bachelor's and first professional [1]			Master's and second professional [2]			Doctor's [3]		
	Total	Men	Women	Total	Men	Women	Total	Men	Women
Engineering (total)	(52,246)	(52,071)	(175)	(4,496)	(4,481)	(15)	(417)	(416)	(1)
Aeronautical	1,712	1,698	14	373	372	1	23	23	
Chemical	4,506	4,474	32	699	698	1	173	172	1
Civil	7,781	7,761	20	689	686	3	28	28	
Electrical	13,270	13,231	39	1,057	1,055	2	80	80	
Mechanical	14,441	14,414	27	784	781	3	46	46	
Other engineering	10,536	10,493	43	894	889	5	67	67	
English	17,246	8,223	9,023	2,259	1,320	939	230	181	49
Entomology	127	118	9	89	85	4	52	50	2
Fine arts	5,707	2,590	3,117	525	345	180	12	6	6
Forestry	2,394	2,394		290	289	1	26	26	
Geography	757	611	146	203	150	53	40	36	4
Geology	3,043	2,934	109	493	477	16	113	110	3
History	13,567	10,242	3,325	1,801	1,373	428	275	246	29
Home economics	7,976	91	7,885	645	15	630	17	1	16
Industrial arts	4,036	3,951	85	352	346	6	5	5	
International relations	981	866	115	279	237	42	25	23	2
Journalism	4,937	3,848	1,089	315	271	44	3	3	
Language, classical	671	474	197	131	72	59	28	19	9
Language, modern (total)	(4,489)	(1,752)	(2,737)	(921)	(457)	(464)	(168)	(135)	(33)
French	1,473	511	962	299	132	167	53	38	15
German	540	359	181	121	75	46	40	32	8
Spanish	2,132	701	1,431	375	166	209	34	26	8
Russian	36	24	12	32	18	14	7	7	
Other languages	308	157	151	94	66	28	34	32	2
Law	14,312	13,891	421	513	492	21	27	26	1
Library science	1,057	155	902	549	226	323	5	4	1
Mathematics	6,392	4,946	1,446	974	784	190	160	151	9
Medical sciences (not elsewhere classified)	3,224	2,495	729	432	390	42	44	39	5
Medicine, M. D. only	5,612	5,028	584						
Metallurgy	476	469	7	120	119	1	46	46	
Meteorology	143	138	5	51	49	2	12	11	1
Military or naval science	162	162							
Music	7,934	4,069	3,865	1,489	942	547	34	32	2
Natural sciences (not elsewhere classified)	1,783	1,465	318	56	39	17	10	8	2
Nursing	3,292	23	3,269	368	5	363	2		2
Optometry	1,801	1,782	19						
Osteopathy	346	327	19	8	7	1			
Pharmacy	5,751	5,310	441	114	92	22	48	47	1
Philosophy	2,835	2,449	386	277	248	29	83	69	14
Physical education	11,054	8,657	2,397	1,406	1,091	315	87	73	14
Physics	3,414	3,287	127	922	888	34	358	353	5
Physiology	133	72	61	147	126	21	36	30	6
Political science	6,346	5,366	980	710	597	113	127	117	10
Psychology	9,582	6,058	3,524	1,316	948	368	283	241	42
Public administration	273	252	21	190	166	24	14	13	1
Public health	440	227	213	523	355	168	25	18	7
Religious education and Bible	3,088	2,093	995	506	260	246	64	61	3
Social sciences (not elswehere classified)	7,472	5,270	2,202	431	261	170	49	42	7
Social work	1,269	439	830	1,747	550	1,197	4	3	1
Sociology	7,887	3,848	4,039	552	373	179	98	80	18
Speech and dramatic arts	4,269	2,321	1,948	652	396	256	43	37	6
Theology	3,221	3,010	211	597	528	69	132	130	2
Veterinary medicine	803	791	12	21	20	1	8	8	
Zoology	3,289	2,727	562	551	435	116	125	102	23
Arts (without major)	12,285	9,365	2,920	1,326	952	374	27	27	
Sciences (without major)	6,680	5,604	1,076	426	379	47	30	29	1
All other	4,442	2,871	1,571	345	243	102	363	323	40

[1] Bachelor's and first professional degrees. In addition to the B. S. and B. A. degrees, such degrees as M. D., LL. B., D. D. S., and B. D. are included.
[2] Master's and second professional degrees. In addition to the M. S. and M. A. degrees, such degrees as M. B. A., M. C. E., M. Chem. E., and Th. M. are included.
[3] Included in this level are such degrees as Ph. D. and Ed. D.

Financing Medical Education

By GEORGE E. VAN DYKE*

THE PRELIMINARY REPORT of the Committee on Medical School Grants and Finances, appointed by the Surgeon General of the Public Health Service, Federal Security Agency, is an outstanding study of the financing of a very complex and expensive branch of higher education. The study was undertaken on the recommendation of the National Advisory Health Council. The committee worked closely with the American Medical Association's Committee on Survey of Medical Education and the Association of Medical Colleges.

The study covered the operations for 1947–48 of 79 medical schools in which 23,054 undergraduate students were enrolled. Of the 79 schools, 72 offered the regular 4-year program in medical education, and 7 offered instruction in the basic science courses only; 68 were affiliated with university organizations, while 11 were separate schools; and 35 were under public control, 44 under private control. The average size of student body was slightly over 300, the largest being 653 students and the smallest, 148.

The study was concerned with financing educational and research programs primarily, although some attention was given to other functions and activities of the medical schools.

Problems of Obtaining Data

Certain problems in collecting data were recognized by the survey staff at the outset, and methods were devised to obtain comparable data so far as possible. The report discusses each of these problems at considerable length.

The first was the lack of uniformity in financial reports. Accounting and reporting systems of these institutions varied greatly in form and content, although some degree of uniformity was seen in that many followed the suggestions of the National Committee on Standard Reports for Institutions of Higher Education.

The second problem was the lack of uniformity in relationships between medical schools and affiliated clinical facilities. In some cases the hospitals finance a large portion of the clinical faculty positions, while in others the hospitals provide space for many of the school's activities. Where a hospital is provided by the institution, the deficits in the operations of the hospital usually are financed either by the medical school or by the university. The interrelations between these various units and functions are not generally reflected in the financial accounts of the medical school, and allocations of expense and income had to be accomplished by the finance officers of the institutions.

A third problem was the lack of financial data and information on the services and facilities provided by organizations outside the medical school, such as other departments and colleges within the university organization. Wide variations exist in the degree of affiliation of medical schools with parent universities. Some are closely tied in with the universities of which they are parts, while in others the relationship is nebulous. In the various types of affiliation the financial accounts of the institutions rarely reflected the monetary value of the services exchanged between the units.

Organizations outside the medical school frequently perform services for the school. In one case, for example, all the teaching and research in two departments of instruction is done by an outside organization with no reflection in the financial records of the school of the expenditures for such work. Considerable effort was made to ascertain data from these outside affiliated agencies.

Finally, there were the usual problems in cost studies of allocating general administrative charges, library expenditures, and expenditures for the operation and maintenance of the physical plant to a teaching department which is only one of many departments in a complex university organization.

After considerable thought and discussion, the survey staff decided to confine the major part of the study to expenditures for the basic undergraduate program of instruction, including in their computations expenses for salaries, supplies, and equipment for direct classroom and laboratory teaching, expenses for the direct administration of the medical school and a share of general university administration in the affiliated schools, operation and maintenance of the physical plant used by the medical school, and the library services provided for students

*Specialist for college business management, Division of Higher Education, Office of Education.

(91 percent) came from designated gifts and grants

and faculty of these schools. As far as possible, the survey staff excluded from the basic expenditures those for separately budgeted research, clinical facilities, hospitals, postgraduate instruction (where separately organized and budgeted), and noneducational activities. These expense items were discussed separately.

Current Expenditures

In 1947–48 the 79 medical schools included in the study spent a total of $53,450,807 for the undergraduate instructional program. Over 80 percent of this sum was spent by the 4-year medical schools, only $1,030,557 being involved in the seven basic science schools. In the analysis of the distribution of expenditures among the four instructional functions, there appeared to be little difference between the publicly controlled institutions and the private. See table 1.

Table 1.—Current expenditures in 1947–48 for undergraduate instructional programs in 72 four-year medical schools, by function and type of control

Function	Total, 72 schools		29 publicly controlled		43 privately controlled	
		Percent		Percent		Percent
Administration and general	$7,800,719	15	$3,099,434	14	$4,701,285	15
Direct instruction	35,824,192	68	14,751,121	67	21,073,071	69
Libraries	1,450,155	3	650,896	3	799,259	3
Plant operation and maintenance	7,345,184	14	3,423,241	16	3,921,943	13
Total	52,420,250	100	21,924,692	100	30,495,558	100

Expenditures per student for the undergraduate instructional program were computed in 70 of the 72 four-year schools, 27 being under public control and 43 under private. The average (mean) expense per student was $2,285; in the public schools it was $2,432, and in the private, $2,196. The highest expenditure per student, $8,257, was more than 10 times greater than the lowest, $754. The range from the first to the third quartiles was from $1,368 to $2,658.

Expenditures per student for direct instructional activities were computed for the same group of schools. Again great variation among the institutions was the rule. The highest expenditure per student, $5,848, was more than 11 times greater than the lowest, $492; the range from the first quartile to the third was from $844 to $1,952; the average (mean) was $1,560.

During the same year a total of $17,132,148 was spent for separately budgeted research by the 79 schools. Practically all of it was spent in the four-year schools, only $27,575 being spent in the basic science schools. The report points out that, in general, the larger the total operating budget of a medical school, the higher the proportion of funds expended for research. Also, separately budgeted research appears to be concentrated in relatively few institutions. Twelve schools each spent more than a half million dollars during the year for this function, and their combined expenditures accounted for more than half of the total spent by the 79 schools, while only 3 percent of the total was expended in 21 schools, each spending less than $50,000 for this function.

Current Income and Support

The survey developed a concept of basic income which constitutes an important frame of reference for identifying and measuring the sources of income for the support of medical schools. The report stated that, although this basic operating income unit is admittedly an arbitrary concept, it is as satisfactory as any other measure now available on the support of medical schools and provides a means of identifying the source of support in meeting the basic operating expenditures of the school.

The income categories and the percentage of total resources for the 72 four-year medical schools in 1947–48 are shown in table 2 by type of control.

Table 2.—Current income and support in 1947–48 for undergraduate instructional programs in 72 four-year medical schools, by source and type of control

Source	Total, 72 schools		29 publicly controlled		43 privately controlled	
		Percent		Percent		Percent
Governmental appropriations and university transfers	$24,104,611	46	$16,643,707	76	$7,460,904	25
Tuition and fees	11,966,134	23	3,653,263	17	8,312,871	27
Gifts and grants	6,864,805	13	1,171,683	5	5,693,122	19
Endowment income	6,662,483	13	223,473	1	6,439,010	21
Miscellaneous	2,822,217	5	232,566	1	2,589,651	8
Total	53,420,250	100	21,924,692	100	30,495,558	100

During the same year, the general operating funds of the medical schools provided very little support (3 percent of the total) for the separately budgeted research activities. Practically all the support

(91 percent) came from designated gifts and grants for research and research contracts. A small proportion of the support (6 percent) was in the form of income from restricted endowment funds.

Changes From 1940–41 to 1947–48

A comparison of operating expenditures and income in 1947–48 with those in 1940–41, the last full academic year before World War II, gives some indication of the financial problems now facing these institutions. Reliable and accurate financial data for the first year were available in 54 of the four-year schools, and the comparisons reported cover only those institutions.

Expenditures almost doubled from 1940–41 to 1947–48, the increase for the basic undergraduate instructional program amounting to 94 percent. Increases in costs of supplies and commodities, increases in salaries, and expansion of activities of the schools were the factors contributing to this increase in total operating expenditures.

Income from tuition and fees increased 36 percent during the same period, but declined from 35 percent to 25 percent as a source of total income for the basic operating programs. Although endowment funds increased $37,922,385 and the income from these funds also increased, this income provided a smaller share of the total income, decreasing from 24 percent in 1940–41 to 14 percent in 1947–48. The usual differences between publicly and privately controlled institutions were found in respect to sources of support. See table 3.

Table 3.—Percentage distribution of income by source in 54 four-year medical schools for 1940–41 and 1947–48

Sources of income	1940–41			1947–48		
	Public	Private	Combined	Public	Private	Combined
Tuition and fees	29	37	34	18	28	24
Endowment income	5	33	24	1	21	14
Gifts and grants	16	23	21	6	17	13
All other sources	50	7	21	75	34	49

Needs of Medical Schools

The needs of medical schools as reported by administrative officers may be summarized as follows:

1. Nearly all schools reported need of additional funds for construction of plant facilities as well as for current operating budgets, if they are to maintain their present standards of training, or improve them. This need was reported by the larger and presumably well-financed schools as well as by the smaller.

2. Thirty-three schools have had to curtail their programs, and others have postponed essential improvements, because of lack of funds.

3. It is estimated that the schools need about $330,000,000 for the construction of facilities and $40,000,000 annually for current operations. In 34 schools, the average amount needed for construction amounted to $4,400,000 per school.

4. Plans to increase freshman enrollments are being considered by 55 medical schools. The increase would be about 1,475 freshmen, which was 32 percent of the freshman enrollment of the 55 schools and 22 percent of the freshman enrollment in the 79 schools included in the study. However, this increase would necessitate approximately $244,000,000 for new construction and $18,000,000 for current operating budgets.

5. The most serious obstacles to increasing freshman enrollments, as cited by the deans and administrative officers of these schools, were, in the order of frequency of mention, lack of space, needed additional faculty, and lack of equipment.

Significance of the Study

The study is significant, not only in the findings and the costs computed, but even more for the development and application of techniques in studying the financial management of a complex area of higher education. Even though factual data in several areas are fragmentary, the study discloses information which no previous study has presented. It is of signal value as a pioneer work and should focus the attention of college and university business officers on the importance—even the necessity, in the future—of knowing more about the financial management of our institutions of higher education.

International Summer School in Sweden

DURING the coming summer, from July 20 to August 21 the College of Puget Sound, Tacoma, Wash., and the Union School of Theology of the Methodist Church in Scandinavia, Gothenburg, Sweden, will cooperate in a summer session of college and university studies on the campus of the Union school. The courses, given in English, will be in liberal arts, education, and theology.

Exemption from Entrance Requirements

CARLETON COLLEGE has adopted a policy of accepting a high score in the College Entrance Examinations in one physical or biological science as evidence that the student has satisfied the college requirement in that area. Students may also meet the minimum graduation requirement in a foreign language by demonstrating proficiency on that College Entrance Examination. Both through the College Entrance Examination and through the special proficiency tests in English given all incoming students, freshmen may also test out of the required freshman English course and go directly into the sophomore course in English literature.

This year 3 students were exempted from the distribution requirement in the biological sciences, 17 from the requirement in physical sciences, 12 from the requirement in foreign language, and 31 from freshman English.

Fourth Salzburg American Seminar

THE FOURTH SALZBURG AMERICAN SEMINAR, held during the past summer in Salzburg, Germany, was attended by 92 European scholars, teachers, journalists, and civil servants. They came from 13 countries and were taught by a faculty of 11 American professors. Earlier in the year the seminar received a grant of $50,000 from the Rockefeller Foundation.

Applications to Dental Schools

A RECORD NUMBER of 11,000 men and women sought enrollment in freshman classes at the Nation's 41 accredited dental schools this fall. Openings were limited to 3,200 freshmen. In all, a total of more than 18,000 applications for admission, an average of 1.7 per applicant, were submitted to the dental schools.

Interest in entering the dental profession reached an all-time high despite the greatly lowered percentage of students who are eligible for Government aid under the GI bill. In 1947, the peak year for veterans' educational benefits, 91 percent of the freshmen in dental schools were veterans studying under the GI bill. That year, a total of 10,133 persons sought admission to dental schools. This year only from 35 to 40 percent of the new freshman dental students will be eligible for GI benefits.

NEW PUBLICATIONS

Government Publications

How To Obtain

(*1*) *Cost Publications: Send request, enclosing remittance (check or money order), to the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C.*

(*2*) *Free Publications: Request direct from the agency issuing them.*

From the Office of Education

Compulsory Education Requirements, by Ward W. Keesecker and Alfred C. Allen. Washington. Circular No. 278, September 1950. 11 p. Proc. Single copies free.

Home Economics in Degree-Granting Institutions, 1949–1950, by Mary Laxson. Washington. Misc. 2557, Revised 1950. 16 p. Proc. Single copies free.

Movie Projectors in Public High Schools, by Seerley Reid. Washington, U. S. Government Printing Office, 1950. Pamphlet No. 109. 16 p. Paper, 15 cents.

School Buildings: Remodeling, Rehabilitation, Modernization, Repair, by Nelson E. Viles. Washington, U. S. Government Printing Office, 1950. 37 p. Paper, 20 cents.

The Functions of State Departments of Education, by Fred F. Beach, in cooperation with the Study Commission of the National Council of Chief State School Officers. Washington, D. C., U. S. Government Printing Office, 1950. Miscellaneous No. 12, 1950. 70 p. 40 cents.

Time Allotment of the 48 State Department of Education Staffs.—A supplement to the cooperative study entitled *The Functions of State Departments of Education*, by Fred F. Beach. Washington, D. C., 1950. 82 p. Proc. Free.

Non-Government Publications

College Education and Character: Proceedings of the Summer Work Conference, 1949, Sponsored by the Pennsylvania Association of Colleges and Universities. 311 State Theatre Building, Harrisburg, Pa., The Association, 1949. 65 p.

Five addresses and four conference reports dealing with various aspects of the subject.

R.

DEC 12 1

PERIODICAL ROOM

Developments in Public Social Welfare and Their Implications for Education. 311 State Theatre Building, Harrisburg, Pa., Pennsylvania Association of Colleges and Universities, 1950. 62 p.

Proceedings of the second annual conference sponsored by the Pennsylvania Agency-School Committee on Preparation for Public Social Welfare and the Pennsylvania Association of Colleges and Universities, Harrisburg, Pa., Jan. 20–21, 1950. Five addresses, report of a panel discussion, and a report on a general discussion.

Education for One World: Annual Census of Foreign Students in the United States, 1949–50. New York, N. Y., Institute of International Education, 1950. 51 p.

Report on 26,433 students above high-school level from foreign countries who were enrolled in schools, colleges, and universities of the United States in 1949–50. Deals with countries of origin, studies pursued, financial assistance, and where students were enrolled.

Education of the Gifted. Washington, D. C., National Education Association, 1950. 88 p. Paper, 35 cents.

A report of the Educational Policies Commission of the National Education Association and the American Association of School Administrators. The topics treated are: The Role of the Gifted in a Democracy; Waste of Talent in American Life; Identification of the Gifted; Education of the Gifted; and Investment in Talent.

Essays in Teaching, Harold Taylor (*ed*). New York, N. Y., Harper & Brothers, 1950. 239 p. $3.

Twelve members of the faculty of Sarah Lawrence College tell how they teach their subjects and how the philosophy of education of the college is carried out in the actual teaching. Among the subjects dealt with are philosophy, literature, psychology, history, art, music, and biology.

Future Needs in Student Personnel Work: A Statement Prepared at a Conference of College and University Educators. Washington, D. C., American Council on Education, 1950. 16 p. Paper, 15 cents.

States and comments briefly on 12 needs in student personnel work in colleges and universities. The conference, which was sponsored by the American Council on Education and the U. S. Office of Education, consisted of 34 persons, only a few of whom represented personnel services.

Health Services in State Institutions of Higher Learning in Mississippi: Report of a Survey, F. O. Robertson, Survey Director. Washington, D. C., American Council on Education, 1950. 67 p. Paper, $1.

For the six State colleges and the State university covers the following items: Personnel, medical examinations, medical records, medical facilities, environmental program, counseling program as related to health, faculty and staff, administration and organization of the student health service, recreation, and health education.

Medical Education in the United States and Canada, 1949–50. (Reprinted from the Educational Number of the *Journal of the American Medical Association*, Vol. 144, p. 109–184, Sept. 9, 1950), and *Proceedings of the Annual Congress on Medical Education and Licensure*, Feb. 6–7, 1950. Chicago, Ill., American Medical Association, 1950. 149 p.

The part on medical education in the United States and Canada is a comprehensive review of many aspects of medical education for the year 1949–50. Extensive data are given concerning medical schools, students, graduates, and major developments. The proceedings of the Congress on Medical Education and Licensure include papers, discussions of papers, and panel discussions of topics on the education and licensure of physicians.

The New Curriculum: A Review and an Assessment. Geneva, N. Y., Hobart and William Smith Colleges, 1950. Official Publication, Colleges of the Seneca, Vol. 48, No. 3, June 1950. 81 p.

A review and appraisal of the new curriculum in general education of Hobart and William Smith Colleges undertaken at the end of 5 years of experience with its present form. Describes the origin, basic principles, and unique feature of the curriculum. In the evaluation the emphasis is on the course in Western Civilization and the one on the Study of Society.

HIGHER EDUCATION

Published semimonthly from September through May, by the Office of Education. Its printing is approved by the Bureau of the Budget as required by Rule 42 of the Joint Committee on Printing. Prepared in the Division of Higher Education.

MANAGING COMMITTEE

Lloyd E. Blauch, Chairman

Henry H. Armsby	Robert Iffert
W. Earl Armstrong	Fred J. Kelly
Willard W. Blaesser	Jennings B. Sanders
Claude E. Hawley	George E. Van Dyke
Ernest V. Hollis	Bernard B. Watson

William R. Wood

Publication Office: Office of Education
FEDERAL SECURITY AGENCY, WASHINGTON 25, D. C.

Subscription: In advance, $1 a year (10 cents a single copy), to foreign countries $1.50. For orders of 100 copies or more in bulk to one address within the United States, 25 percent discount is allowed. Orders with remittance should be sent to the Superintendent of Documents, Government Printing Office, Washington 25, D. C.

OSCAR R. EWING—Federal Security Administrator
EARL JAMES McGRATH, Commissioner of Education
JOHN DALE RUSSELL, Director, Division of Higher Education

U. S. GOVERNMENT PRINTING OFFICE: 1950